

Fossils found of bizarre creature that ruled an ancient shallow sea

By Los Angeles Times, adapted by Newsela staff on 03.16.15

Word Count **879**



Pictured is an 8.2-foot fossil of the arthropod, *Jaekelopterus rhenaniae*. The newly discovered *Aegirocassis benmoulae* could grow up to 7 feet. Photo: Wikimedia Commons

Paleontologists have found fossils of a bizarre sea creature that are providing an important clue to how arthropods evolved.

The newly discovered animal, named *Aegirocassis benmoulae*, grew up to 7 feet in length and ate plankton like a whale. It was an early member of the arthropod family — animals with external skeletons — making it an ancient ancestor of cockroaches, butterflies and lobsters. The creature lived about 480 million years ago in a shallow sea that once covered part of the Sahara in what is now Morocco.

“It is one of the biggest arthropods that ever existed, far bigger than any arthropod today,” said Peter Van Roy. He is a paleobiologist at Yale University who helped uncover some of the specimens of the extinct animal.

A paper describing the early arthropod was published Wednesday in the scientific magazine *Nature*.

Flat-Bodied Water Dwellers

Aegirocassis benmoulae is part of an extinct group of animals known as anomalocaridid. They were the largest animals of the Cambrian time period, from 543 million to 490 million years ago. *Aegirocassis benmoulae* is the latest of these animals to be found and is more than double the size of the biggest of its older known relatives.

The newly discovered sea creature was alive during the Great Ordovician Biodiversification Event, a period when many new species evolved. It occurred about 10 million years after the Cambrian period came to a close.

All of the anomalocaridids were flat-bodied water dwellers, and all of them had two appendages in the front of their mouths. These structures were mostly used to grasp prey like worms and mollusks. However, they took on a different form in *Aegirocassis benmoulae*, making an elaborate structure of spikes like a net that allowed it to suck plankton in the water into its mouth, as whales do.

Despite its large size, *Aegirocassis benmoulae* appears to have been fairly common, Van Roy said. He and the Moroccan fossil collector Mohamed Ben Moula, who first discovered them, have found dozens of preserved specimens in the Moroccan desert.

"They may have come together to molt, or they may have lived in a group," he said. "It is interesting we found so many of them. It shows there was a well developed, rich plankton system in place 480 million years ago."

"Turn Soft Tissues To Stone"

Arthropods first showed up in the fossil record about 530 million years ago. Today the arthropod category is the most diverse group of animals on the planet.

However, early fossils of arthropods are hard to come by, which made this particular find so exciting.

Most fossils are the remains of the hard parts of organisms, like shells and bone, because soft tissues, like skin, decay so rapidly after death, explained John Paterson. He is a professor at the University of New England in Armidale, Australia, and was not involved in the study.

"However, these extraordinary fossils are soft-bodied, which are typically very rare," he said. "They require rapid burial and low oxygen conditions in order to be preserved in such exquisite detail."

According to Van Roy, giant storms occasionally caused large mud flows to wash into the ancient sea. These storms smothered everything at the bottom, making it impossible for other creatures to disturb what was down there.

With the right conditions, "then you can basically turn soft tissues to stone," he said. "But a very specific set of criteria must be met, so sites like this are extremely rare."

The fossils were so well preserved, they helped the scientists solve a long-standing evolutionary mystery.

Arthropods have been so successful because of the way they developed. Their bodies and legs are made of multiple segments, which can be used for a variety of purposes. This allows them to adapt to a wide range of environments.

Second Set Of Swimming Flaps

Today, the legs of most arthropods have two segments, but researchers were not sure how these double-segmented legs had evolved over time.

Paleontologists thought they could trace the origins of the modern arthropod leg to an arthropod ancestor from the early Cambrian period. This ancient animal had a set of flaps that ran down the top side of its body for swimming, like an upper limb, and a set of legs on its belly side, for walking.

And yet, the anomalocaridids — the later arthropod group that the newly discovered sea creature belonged to — seemed to have just one set of flaps on the lower side of the body. This led researchers to wonder where the upper limb had gone.

The new fossils described in the Nature paper suggest that the second limb did not go anywhere. They show that anomalocaridids actually did have a second set of swimming flaps on the back side of their segments. They were preserved only in these particularly complete fossils.

These flaps represent the ancestors of more modern-style limbs seen in other arthropods, Paterson said.

Van Roy said there were still many more fossils to go through from the Moroccan site.

"We have something like 5,000 or 6,000 specimens, most of them unstudied," he said.

Among the other animals they found are more advanced arthropods. These include a variety of horseshoe crabs, some which look remarkably like modern-day horseshoe crabs, as well as jellyfish relatives, and early starfish and snails.